CLAIMS

1. A method of transmitting a wideband pilot in a wireless multi-carrier communication system, comprising:

processing at least one pilot symbol with a pseudo-random number (PN) code to obtain a sequence of pilot chips for the wideband pilot;

processing data symbols in accordance with a multi-carrier modulation scheme to obtain a sequence of data chips;

time division multiplexing the sequence of pilot chips with the sequence of data chips to obtain a time division multiplexed (TDM) sequence of pilot and data chips; and

transmitting the TDM sequence of pilot and data chips.

2. The method of claim 1, wherein the wireless multi-carrier communication system is an orthogonal frequency division multiple access (OFDMA) communication system, and wherein the multi-carrier modulation scheme is orthogonal frequency division multiplexing (OFDM).

3. The method of claim 1, wherein the at least one pilot symbol is spectrally spread with the PN code in time domain using direct sequence spread spectrum processing to obtain the sequence of pilot chips.

4. The method of claim 1, wherein the PN code uniquely identifies a transmitting entity of the wideband pilot.

5. The method of claim 1, wherein the system includes a plurality of subbands, and wherein the data symbols are sent on different ones of the plurality of subbands in different time intervals as determined by a frequency hopping (FH) sequence.

6. The method of claim 1, further comprising:

scaling the sequence of pilot chips with a scaling factor to obtain a sequence of scaled pilot chips, wherein the scaling factor is indicative of a transmit power level for the wideband pilot, and wherein the sequence of scaled pilot chips is time division multiplexed with the sequence of data chips.

7. The method of claim 1, wherein the TDM sequence of pilot and data chips is transmitted on a reverse link in the system.

8. An apparatus in a wireless multi-carrier communication system, comprising:

means for processing at least one pilot symbol with a pseudo-random number (PN) code to obtain a sequence of pilot chips for a wideband pilot;

means for processing data symbols in accordance with a multi-carrier modulation scheme to obtain a sequence of data chips;

means for time division multiplexing the sequence of pilot chips with the sequence of data chips to obtain a time division multiplexed (TDM) sequence of pilot and data chips; and

means for transmitting the TDM sequence of pilot and data chips.

9. An apparatus in a wireless multi-carrier communication system, comprising:

a modulator operative to process data symbols in accordance with a multi-carrier modulation scheme to obtain a sequence of data chips;

a pilot generator operative to process at least one pilot symbol with a pseudo-random number (PN) code to obtain a sequence of pilot chips for a wideband pilot;

a multiplexer operative to time division multiplex (TDM) the sequence of pilot chips with the sequence of data chips to obtain a TDM sequence of pilot and data chips; and

a transmitter unit operative to process and transmit the TDM sequence of pilot and data chips.

10. A terminal comprising the apparatus of claim 9.

11. A base station comprising the apparatus of claim 9.

12. A processor readable media for storing instructions operable to:

process at least one pilot symbol with a pseudo-random number (PN) code to obtain a sequence of pilot chips for a wideband pilot in a wireless multi-carrier communication system;

process data symbols in accordance with a multi-carrier modulation scheme to obtain a sequence of data chips; and

time division multiplex the sequence of pilot chips with the sequence of data chips to obtain a time division multiplexed (TDM) sequence of pilot and data chips, wherein the TDM sequence of pilot and data chips is processed and transmitted over a communication channel in the system.

13. A method of receiving a wideband pilot in a wireless multi-carrier communication system, comprising:

obtaining a sequence of received chips that includes a time division multiplexed (TDM) sequence of received pilot and data chips;

demultiplexing the sequence of received chips to obtain a sequence of received pilot chips for the wideband pilot and a sequence of received data chips;

processing the sequence of received pilot chips with a pseudo-random number (PN) code to obtain a plurality of channel response estimates for a plurality of subbands; and

processing the sequence of received data chips in accordance with a multi-carrier demodulation scheme and with the plurality of channel response estimates to obtain recovered data symbols.

14. The method of claim 13, wherein the wireless multi-carrier communication system is an orthogonal frequency division multiple access (OFDMA) communication system, and wherein the multi-carrier demodulation scheme is for orthogonal frequency division multiplexing (OFDM).

15. The method of claim 13, wherein the processing the sequence of received pilot chips includes

obtaining a plurality of channel gain estimates for a plurality of propagation paths for the wideband pilot,

processing the plurality of channel gain estimates to obtain a sequence of chip-spaced gain values, and

transforming the sequence of chip-spaced gain values to obtain the plurality of channel response estimates for the plurality of subbands.

16. The method of claim 15, wherein the plurality of channel gain estimates are obtained with a rake receiver having a plurality of finger processors, wherein each finger processor is operative to process a different one of the plurality of propagation paths to provide a channel gain estimate for the propagation path.

17. The method of claim 13, wherein the system includes a plurality of subbands, and wherein the recovered data symbols are obtained from different ones of the plurality of subbands in different time intervals as determined by a frequency hopping (FH) sequence.

18. An apparatus in a wireless multi-carrier communication system, comprising:

means for obtaining a sequence of received chips that includes a time division multiplexed (TDM) sequence of received pilot and data chips;

means for demultiplexing the sequence of received chips to obtain a sequence of received pilot chips for a wideband pilot and a sequence of received data chips;

means for processing the sequence of received pilot chips with a pseudo-random number (PN) code to obtain a plurality of channel response estimates for a plurality of subbands; and

means for processing the sequence of received data chips in accordance with a multi-carrier demodulation scheme and with the plurality of channel response estimates to obtain recovered data symbols.

19. An apparatus in a wireless multi-carrier communication system, comprising:

a demultiplexer operative to demultiplex a sequence of received chips to provide a sequence of received pilot chips for a wideband pilot and a sequence of received data chips, wherein the sequence of received chips includes a time division multiplexed (TDM) sequence of received pilot and data chips;

a rake receiver operative to process the sequence of received pilot chips with a pseudo-random number (PN) code to obtain a plurality of channel gain estimates for a plurality of propagation paths for the wideband pilot;

a processor operative to process the plurality of channel gain estimates to obtain a plurality of channel response estimates for a plurality of subbands; and

a demodulator operative to process the sequence of received data chips in accordance with a multi-carrier demodulation scheme and with the plurality of channel response estimates to obtain recovered data symbols.

20. A method of transmitting a wideband pilot in a wireless multi-carrier communication system, comprising:

processing at least one pilot symbol with a pseudo-random number (PN) code to obtain a sequence of pilot chips for the wideband pilot;

processing data symbols in accordance with a multi-carrier modulation scheme to obtain a sequence of data chips;

summing the sequence of pilot chips with the sequence of data chips to obtain a sequence of combined pilot and data chips, and

transmitting the sequence of combined pilot and data chips.

21. The method of claim 20, wherein the wireless multi-carrier communication system is an orthogonal frequency division multiple access (OFDMA) communication system, and wherein the multi-carrier modulation scheme is orthogonal frequency division multiplexing (OFDM).

22. The method of claim 20, wherein the wideband pilot is transmitted continuously for the duration of the sequence of data chips.

23. The method of claim 20, wherein the at least one pilot symbol is spectrally spread with the PN code in time domain using direct sequence spread spectrum processing to obtain the sequence of pilot chips.

24. The method of claim 20, wherein the PN code uniquely identifies a transmitting entity of the wideband pilot.

25. The method of claim 20, wherein the system includes a plurality of subbands, and wherein the data symbols are sent on different ones of the plurality of subbands in different time intervals as determined by a frequency hopping (FH) sequence.

26. The method of claim 20, further comprising:

scaling the sequence of pilot chips with a scaling factor to obtain a sequence of scaled pilot chips, wherein the scaling factor is indicative of a transmit power level for the wideband pilot, and wherein the sequence of scaled pilot chips is summed with the sequence of data chips.

27. The method of claim 20, wherein the sequence of combined pilot and data chips is transmitted on a reverse link in the system.

28. An apparatus in a wireless multi-carrier communication system, comprising:

means for processing at least one pilot symbol with a pseudo-random number (PN) code to obtain a sequence of pilot chips for a wideband pilot;

means for processing data symbols in accordance with a multi-carrier modulation scheme to obtain a sequence of data chips;

means for summing the sequence of pilot chips with the sequence of data chips to obtain a sequence of combined pilot and data chips; and

means for transmitting the sequence of combined pilot and data chips

29. A method of receiving a wideband pilot in a wireless multi-carrier communication system, comprising:

obtaining a sequence of received chips that includes a sequence of combined pilot and data chips transmitted by a transmitting entity, wherein the sequence of combined pilot and data chips is obtained by summing a sequence of pilot chips for the wideband pilot with a sequence of data chips at the transmitting entity;

processing the sequence of received chips with a pseudo-random number (PN) code to obtain a plurality of channel response estimates for a plurality of subbands for the transmitting entity; and

processing the sequence of received chips in accordance with a multi-carrier demodulation scheme and with the plurality of channel response estimates to obtain recovered data symbols for the transmitting entity.

30. The method of claim 29, wherein the processing the sequence of received chips with a PN code includes

obtaining a plurality of channel gain estimates for a plurality of propagation paths for the transmitting entity,

processing the plurality of channel gain estimates to obtain a sequence of chip-spaced gain values, and

transforming the sequence of chip-spaced gain values to obtain the plurality of channel response estimates for the plurality of subbands for the transmitting entity.

31. The method of claim 30, wherein the plurality of channel gain estimates are obtained with a rake receiver having a plurality of finger processors, wherein each finger processor is operative to process a different one of the plurality of propagation paths to provide a channel gain estimate for the propagation path.

32. The method of claim 29, further comprising:

estimating interference due to the wideband pilot; and

canceling the estimated interference from the sequence of received chips to obtain a sequence of received data chips, and wherein the sequence of received data chips is processed to obtain the recovered data symbols.

33. The method of claim 29, wherein the wireless multi-carrier communication system is an orthogonal frequency division multiple access (OFDMA) communication system, and wherein the multi-carrier demodulation scheme is for orthogonal frequency division multiplexing (OFDM).

34. An apparatus in a wireless multi-carrier communication system, comprising:

means for obtaining a sequence of received chips that includes a sequence of combined pilot and data chips transmitted by a transmitting entity, wherein the sequence of combined pilot and data chips is obtained by summing a sequence of pilot chips for a wideband pilot with a sequence of data chips at the transmitting entity;

means for processing the sequence of received chips with a pseudo-random number (PN) code to obtain a plurality of channel response estimates for a plurality of subbands for the transmitting entity; and

means for processing the sequence of received chips in accordance with a multi-carrier demodulation scheme and with the plurality of channel response estimates to obtain recovered data symbols for the transmitting entity.

35. An apparatus in a wireless multi-carrier communication system, comprising:

a rake receiver operative to process a sequence of received chips with a pseudo-random number (PN) code to obtain a plurality of channel gain estimates for a plurality of propagation paths for a transmitting entity, wherein the sequence of received chips includes a sequence of combined pilot and data chips transmitted by the transmitting entity and obtained by summing a sequence of pilot chips for a wideband pilot with a sequence of data chips at the transmitting entity;

a processor operative to process the plurality of channel gain estimates to obtain a plurality of channel response estimates for a plurality of subbands; and

a demodulator operative to process the sequence of received chips in accordance with a multi-carrier demodulation scheme and with the plurality of channel response estimates to obtain recovered data symbols for the transmitting entity.